Data Acquisition

CYCOM 485

ISA 2-Port RS-485 Serial Interface Card, 2 DB-9F

USER'S MANUAL

VER. 3.0C• Aug-11

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Revision History		
Revision #	**Description**	**Date of Issue**
3.0C	Revision	August 13, 2011

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About this User's Guide

What you will learn from this user's guide

This user's guide describes the CyberResearch™ CYCOM 485 data acquisition devices and lists device specifications.

Conventions in this user's guide

For more information about …

Text presented in a box signifies additional information and helpful hints related to the subject matter you are reading.

Caution! Shaded caution statements present information to help you avoid injuring yourself and others, damaging your hardware, or losing your data.

bold text **Bold** text is used for the names of objects on a screen, such as buttons, text boxes, and check boxes.

italic text *Italic* text is used for the names of manuals and help topic titles, and to emphasize a word or phrase.

Where to find more information

Additional information about CYCOM 485 hardware is available on our website at www.cyberresearch.com. You can also contact CyberResearch, Inc. by phone, fax, or email with specific questions.

Introducing the CYCOM 485

The CYCOM 485 is a serial interface for the IBM PC and compatibles. The UART (serial communications chip) is a 16550. The physical interface conforms to the RS485 standard.

The 16550 UART is the standard UART of the personal computer. Any software which is designed to control IBM PC serial COM ports will work with the CYCOM 485. A base address switch and interrupt jumper allow you to select one of four COM ports; COM1, COM2, COM3, or COM4.

The RS485 interface allows multiple transmitters as well as multiple receivers to communicate on a two-wire serial link thereby making possible serial networks. Many instruments are equipped with RS485 interfaces as are the remote data acquisition and control modules from CyberResearch, Inc.

Because the RS485 interface calls for each node to be either a transmitter or receiver, the CYCOM 485 can swap the transmit and receive lines. A register on the board allows you to set the CYCOM 485 as a transmitter or receiver. Once written to, this register is not overwritten by standard COM software. The power on default is to configure the CYCOM 485 with neither the transmitter or receiver enabled. One or the other must be enabled via program control.

RS485 is a step up from RS422. RS422 allows multiple receivers but only one transmitter.

Installing a CYCOM 485

Before you open your computer and install the board, install and run InstaCal™, the installation, calibration and test utility included with your board. InstaCal will guide you through switch and jumper settings for your board. Detailed information regarding these settings can be found below.

The CYCOM 485 is easy to install. You must set the COM port number then open your computer and install the board. From that point on simply use any PC compatible communication software to communicate with devices connected to the CYCOM 485.

Before installing the board in your computer you must:

1. Select a COM port number for your CYCOM 485.

2. Disable or remove any COM port currently using that port number.

3. To select the COM port number you must set the base address and interrupt jumper to one of the choices corresponding to COM1, COM2, COM3 or COM4.

Base Address

Set the base address via the 7 position dip switch labeled Base Address. Figure 1 shows the base address switch set for COM1 and COM2 address. The addresses for the COM ports are:

COM1 = 3F8h (All switches down)
COM2 = 2F8h (Switch 8 UP)
COM3 = 3E8h (Switch 4 UP)
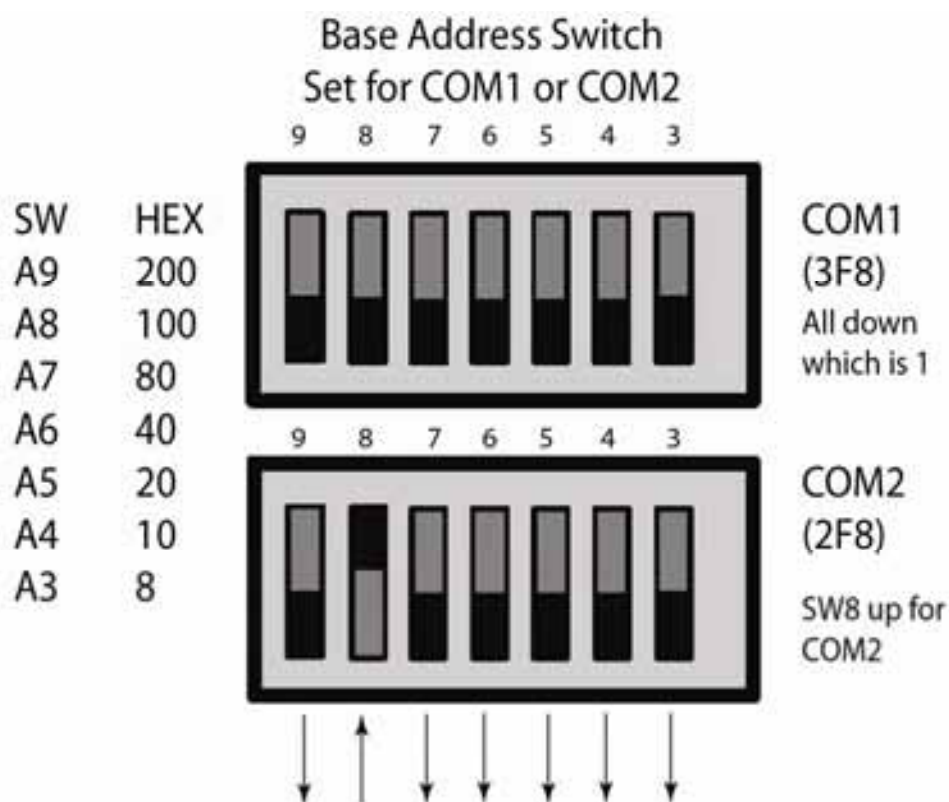COM4 = 2E8h (Switch 8 and 4 UP)

Figure 1. Base Address Select Switches - COM1 and COM2

Interrupts

Set the interrupt with the interrupt level jumper (Figure 2) according to the following:

COM1 = IRQ 4
COM2 = IRQ 3
COM3 = IRQ 4 (or a unique IRQ if your PC's)
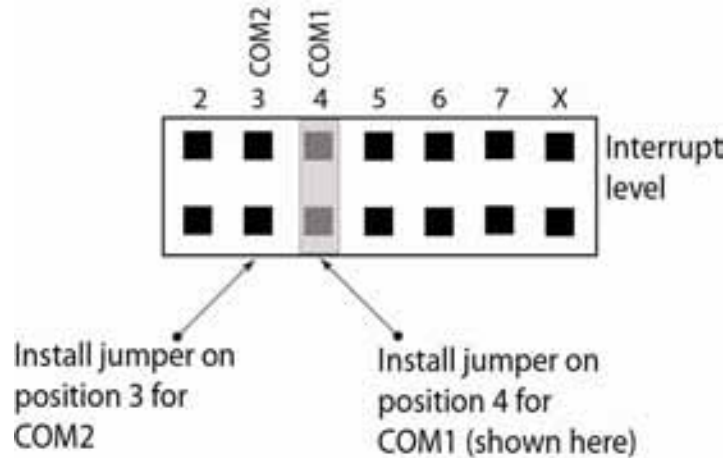COM4 = IRQ 3 (BIOS requires one)

Figure 2. Jumper - Interrupt Levels for COM1/COM2

COM3 and COM4

In order to use COM3 or COM4 you will have to read your computer owner's manual and determine the method of setting the interrupts for COM3 and COM4. There are different methods and the one employed by your computer is dependent on the ROM BIOS installed in the computer.

For example, ZEOS computers require that you assign a unique IRQ number, such as IRQ5, to the COM3 or COM4 port if you install one. The assignment is done in the BIOS setup.

With other computers, you use IRQ4 for COMs 1 and 3 and IRQ3 for COMs 2 and 4. The BIOS determines which COM port to service even though the interrupt may have been generated by one of two COM ports.

The information for using COM3 and COM4 is in your computer's owner's manual. It is not something we can provide you with, nor guide you through.

Disabling Existing COM Ports

Your computer may have been supplied with a COM1 or COM2 port, or both. To use the CYCOM 485 at either COM1 or COM2, you must disable or remove the COM hardware currently installed for that port number.

Some computers, especially older computers, have a board with one or more COM ports installed. Some computers come with COM ports designed into the motherboard. Refer to your computer's owner's manual to determine which type you have.

If the COM ports in your computer are on a separate board you may be able to disable only that COM port (COM1 or COM2) which would conflict with your choice for the CYCOM 485. If you cannot disable the COM port on the board, you could remove the board from the computer.

If the COM ports in your computer are built into the motherboard you will be able to disable one or both either by switches and jumpers on the motherboard, or through ROM BIOS setup.

For example, the ZEOS Ambra computer comes equipped with two serial ports set for COM1 and COM2. These can be disabled individually by jumper settings on the motherboard. Another of our computers allows you to enable or disable the COM ports via the BIOS setup options which are available by pressing F2 while the computer is booting up.

However your computer works, you must have only one COM device per COM address/interrupt. If you have two, neither will work.

Cabling

Cabling to the CYCOM 485 is through a 9-pin, D-type female connector. The CBL 09xxMM is compatible with these connectors.

Figure 3 is a sample RS485 cable with power to a remote module. Multiple modules may be added to the RS485 link.
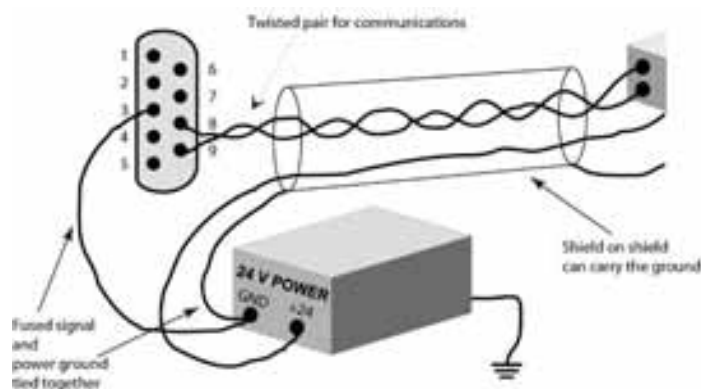

Figure 3. RS485 Cable CYCOM 485 to Remote Module

The pin assignments of this connector are shown in Figure 4. Note: Pins 4 and 8 and pins 5 and 9 are tied together on the board. Only three wires are needed for RS-485 communication. One must be connected to pins 4/8 and the other to pins 5 or 9 to provide the differential communication line. The third wire is for a ground reference.

We strongly recommend that you use the fused ground for the signal ground line. This fuse will protect the CYCOM 485 and the computer from earth ground differences, voltage spikes and transients which could subject the CYCOM 485 to potentially hundreds of volts!

If remote data acquisition modules are being used with the CYCOM 485, those should be powered through a separate power supply. The power supplies for all devices connected to a CYCOM 485 should share the same earth ground.
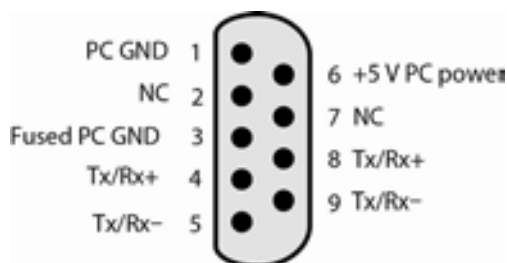

Figure 4. 9-Pin Board Connector

Note that there are two 9-pin connectors on the board (Figure 5). These two connectors are wired in parallel. (A connection to pin 9 on one connector is the same as a connection to pin 9 on the other.)

There is only one communications chip on the CYCOM 485. There are twos connectors to ease cabling from one PC to multiple drops on the RS-485 serial line.

If your application requires more than 31 remote devices, you will need to install a second CYCOM 485. The RS485 standard supports up to 32 separate devices on a single transmission wire pair.
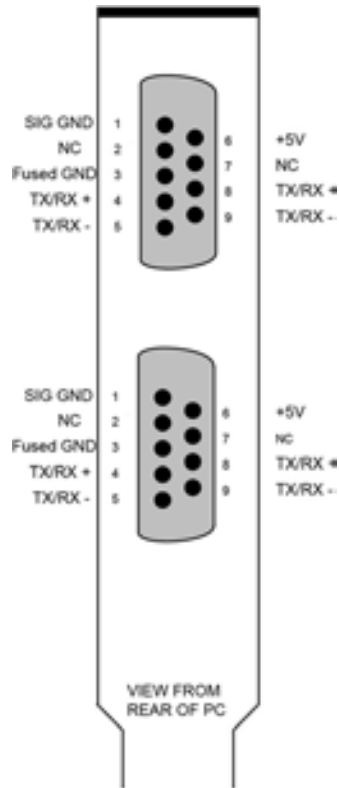
Figure 5. CYCOM 485 Board Connectors

Operation

Introduction and Programming Example

After installation, the CYCOM 485 operates just like any other COM port. Using the serial drivers supplied with DOS, Windows, Languages or applications programs, the CYCOM 485 handles communications with other RS422 or RS485 devices.

Here is a simple example in QuickBasic 4.5 showing how to use the CYCOM 485 board.

```
'Program to communicate with a remote temperature module. 'First configure CyCOM 485 then
configure and communicate with the module.

BASE = &H3F8 'Base address for COM1. TXRX = 7 + BASE 'Address of the transmit/receive
register. TX = 2 'Bit to turn on transmitter. RX = 1 'Bit to turn on receiver. OPEN
"COM1:9600" AS #1 'Set up CyCOM 485 as standard

COM1. OUT TXRX, TX 'Enable COM1 at a transmitter. CMD$ = "%01020E0600" 'Configure module.
PRINT #1, CMD$ 'Send the configuration data. OUT TXRX, RX 'Set CyCOM 485 to receive. GOSUB
DELAY 'Wait for module to configure. RESULT$ = INPUT$(4, #1) 'Read back configuration
result. OUT TXRX, TX CMD$ = @02LO+090.00" 'Configure low alarm limit to 90oC. PRINT #1,
CMD$ GOSUB DELAY
```

The remote module is also an RS485 device. While idle, it is configured as a receiver. After it receives a command (and if that command entails a response) the module becomes a transmitter, transmits status or data, then switches back to the receiver mode.

You can see from the program flow that the CYCOM 485 has to switch back and forth from transmitter to receiver. Also, you must be aware of the constraints of the remote device(s) you are working with. In this case, a subroutine called DELAY provides an adequate delay to allow the remote module to settle back into receiver state.

RS485 communications require that you understand the devices you are working with and program accordingly.

Transmitter/Receiver Enable Register

The BASE + 7 Transmitter/Receiver Enable Register controls the transceivers on the CYCOM 485. There are only two bits in this 8-bit register which control the orientation of the CYCOM 485 transceivers.

Setting the first bit to one turns on the receivers. Setting the second bit to one turns on the transmitters. Turning both on (writing a "3" to the register) turns on both the receiver and transmitter. This mode will echo back everything written even when no cable is in place.

Note: the default value for this register is 0.

You must write to BASE + 7 and enable one of the transceivers before the CYCOM 485 can communicate with other RS485 devices.

BASE + 7 -Control Register (Byte, Write Only)

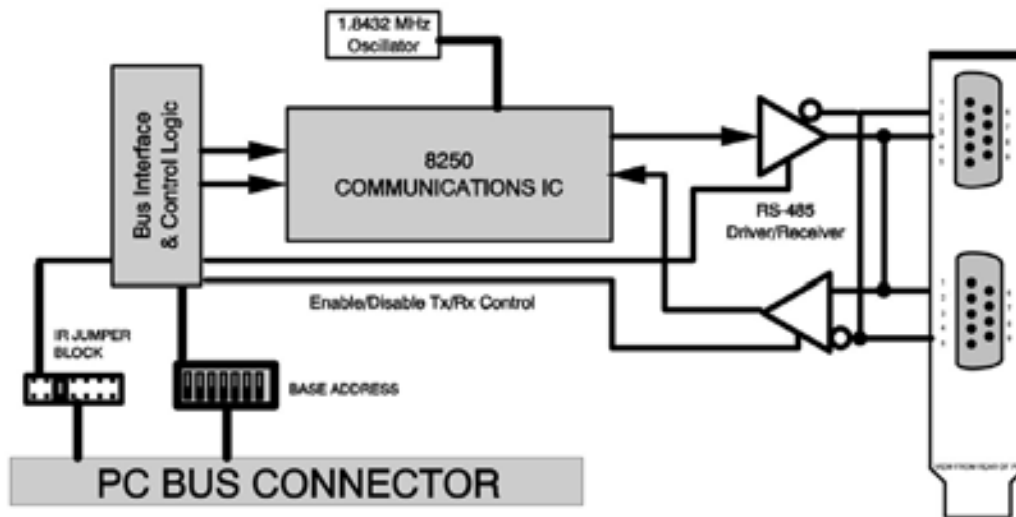| 7	6	5	4	3	2	1	0
X	X	X	X	X	X	XMTR	RCVR

Figure 6. CΥCOM 485 Functional Block Diagram

Intentionally Blamk

Product Service

Diagnosis and Debug

CyberResearch, Inc. maintains technical support lines staffed by experienced Applications Engineers and Technicians. There is no charge to call and we will return your call promptly if it is received while our lines are busy. Most problems encountered with data acquisition products can be solved over the phone. Signal connections and programming are the two most common sources of difficulty. CyberResearch support personnel can help you solve these problems, especially if you are prepared for the call.

To ensure your call's overall success and expediency:

1)   Have the phone close to the PC so you can conveniently and quickly take action that the Applications Engineer might suggest.

2)   Be prepared to open your PC, remove boards, report back-switch or jumper settings, and possibly change settings before reinstalling the modules.

3)   Have a volt meter handy to take measurements of the signals you are trying to measure as well as the signals on the board, module, or power supply.

4)   Isolate problem areas that are not working as you expected.

5)   Have the source code to the program you are having trouble with available so that preceding and prerequisite modes can be referenced and discussed.

6)   Have the manual at hand. Also have the product's utility disks and any other relevant disks nearby so programs and version numbers can be checked.

Preparation will facilitate the diagnosis procedure, save you time, and avoid repeated calls. Here are a few preliminary actions you can take before you call which may solve some of the more common problems:

1)   Check the PC-bus power and any power supply signals.

2)   Check the voltage level of the signal between SIGNAL HIGH and SIGNAL LOW, or SIGNAL+ and SIGNAL– . It CANNOT exceed the full scale range of the board.

3)   Check the other boards in your PC or modules on the network for address and interrupt conflicts.

4)   Refer to the example programs as a baseline for comparing code.

Warranty Notice

CyberResearch, Inc. warrants that this equipment as furnished will be free from defects in material and workmanship for a period of one year from the confirmed date of purchase by the original buyer and that upon written notice of any such defect, CyberResearch, Inc. will, at its option, repair or replace the defective item under the terms of this warranty, subject to the provisions and specific exclusions listed herein.

This warranty shall not apply to equipment that has been previously repaired or altered outside our plant in any way which may, in the judgment of the manufacturer, affect its reliability. Nor will it apply if the equipment has been used in a manner exceeding or inconsistent with its specifications or if the serial number has been removed.

CyberResearch, Inc. does not assume any liability for consequential damages as a result from our products uses, and in any event our liability shall not exceed the original selling price of the equipment.

The equipment warranty shall constitute the sole and exclusive remedy of any Buyer of Seller equipment and the sole and exclusive liability of the Seller, its successors or assigns, in connection with equipment purchased and in lieu of all other warranties expressed implied or statutory, including, but not limited to, any implied warranty of merchant ability or fitness and all other obligations or liabilities of seller, its successors or assigns.

The equipment must be returned postage prepaid. Package it securely and insure it. You will be charged for parts and labor if the warranty period has expired.

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If a CyberResearch product has been diagnosed as being non-functional, is visibly damaged, or must be returned for any other reason, please call for an assigned RMA number. The RMA number is a key piece of information that lets us track and process returned merchandise with the fastest possible turnaround time.

PLEASE CALL FOR AN RMA NUMBER!

Packages returned without an RMA number will be refused!

In most cases, a returned package will be refused at the receiving dock if its contents are not known. The RMA number allows us to reference the history of returned products and determine if they are meeting your application's requirements. When you call customer service for your RMA number, you will be asked to provide information about the product you are returning, your address, and a contact person at your organization.

Please make sure that the RMA number is prominently displayed on the outside of the box.

• Thank You •